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CLAIMS

1.   A power allocation and user assignment method for multimedia broadcast multicast services (MBMS services) in a
5   mobile communication system, the power allocation and user assignment method comprising the steps of:
transmitting a pilot signal to a plurality of user equipments;
sorting each of the plurality of user equipments by a
10   strength of the pilot signal;
determining a number (K) of a particular user equipment of the plurality of user equipments to support on a broadcast channel; and
assigning a portion of the plurality of user equipments,
15   one through K, to the broadcast channel.

2.   The power allocation and user assignment method as claimed in claim 1, wherein the steps of transmitting, sorting, determining a number and assigning are performed by a
20   radio network controller of the mobile communication system.

3.   The power allocation and user assignment method as claimed in claim 1, wherein there is further included a step of collecting by a radio network controller (RNC) of the
25   mobile communication system a signal/noise ratio (S/N) of the pilot signal as received by the plurality of user equipments.

4.   The power allocation and user assignment method as claimed in claim 3, wherein there is further included a step
30   of determining an area coverage threshold corresponding to the number K of the particular user equipment based upon location and channel conditions of the particular user equipment within a cell of the mobile communication system.

5.   The power allocation and user assignment method as claimed in claim 3, wherein there is further included a step of determining by the RNC a coverage area within the cell for
5   the MBMS services.

6.   The power allocation and user assignment method as claimed in claim 5, wherein the step of sorting includes the step of sorting by the RNC the plurality of user equipments by
10   the strength of the S/N of the pilot signal from a strongest pilot signal to a weakest pilot signal.

7.   The power allocation and user assignment method as claimed in claim 6, wherein the step of determining a number K
15   includes a step of:

$$K = \underset{k}{\arg\max}\left(P_B(N_{UE}) - P_B(k) - \left(\sum_{i=k+1}^{N_{UE}} P_i \right) \right)$$

where $P_B(k)$ is the required power allocation of the
20   broadcast channel to support user k, $P_B(Nue)$ is the total power allocation required to cover all users using broadcast channel and P_i is the required power to support user i using a dedicated channel.

25   8.   The power allocation and user assignment method as claimed in claim 6, wherein there is further included a step of assigning by the RNC each of the plurality of user equipments ranked 1 through K by the strength of the pilot signal beginning with the strongest pilot signal, to the
30   broadcast channel.

9. The power allocation and user assignment method as claimed in claim 8, wherein there is further included steps of:

    determining by the RNC whether a total number of the plurality of user equipments requesting MBMS service is greater than K; and

    if the total number is greater than K, assigning by the RNC user equipments K+1 through the total number of the plurality of user equipments to dedicated channels.

10. The power allocation and user assignment method as claimed in claim 9, wherein there is further included a step of setting by the RNC a new area coverage threshold corresponding to the S/N of the pilot signal of the number K of the particular user equipment.

11. The power allocation and user assignment method as claimed in claim 10, wherein there is further included a step of maintaining a power of the broadcast channel less than a maximum power allocated to the broadcast channel for MBMS services by a network operator.

12. The power allocation and user assignment method as claimed in claim 11, wherein the step of maintaining further includes a step of determining an available power by

$$P_{B,AVAIL} = P_{B,MAX} - \left(\sum_{i=K+1}^{N_{UE}} P_i \right) - P_B(K)$$

    where $P_{B,MAX}$ is the maximum power that may be assigned to the MBMS broadcast channel (normally assigned by the operator). This maximum is usually the power required to

cover the entire cell with a certain area coverage reliability.

13. The power allocation and user assignment method as claimed in claim 11, wherein there is further included a step of transmitting the new area coverage threshold to the plurality of user equipments.

14. The power allocation and user assignment method as claimed in claim 2, wherein the steps of transmitting, sorting, determining a number and assigning are performed prior to providing MBMS services by the RNC.

15.　A power allocation and user assignment method for multimedia broadcast multicast services (MBMS service) in a mobile communication system, the power allocation method comprising the steps of:

5　　　during an MBMS broadcast, requesting, by one user equipment of a plurality of user equipments, connection to the MBMS broadcast;

　　　transmitting a signal/noise of a pilot signal by the one user equipment to the mobile communication system;

10　　　if a first power for a dedicated channel is less than a second power for a broadcast channel, assigning by the RNC the one user equipment to the dedicated channel; and

　　　if the second power of the broadcast channel is greater than or equal to the first power of the dedicated channel,

15　assigning the one user equipment by the RNC to the broadcast channel.

16.　The power allocation and user assignment method as claimed in claim 15, wherein the steps of transmitting,

20　assigning and assigning are performed by a radio network controller (RNC) of the mobile communication system.

17.　The power allocation and user assignment method as claimed in claim 16, wherein there is further included a step

25　of determining by the RNC the first power required for the one user equipment on the broadcast channel.

18.　The power allocation method and user assignment as claimed in claim 17, wherein there is further included a step

30　of determining by the RNC the second power required for the one user equipment on the dedicated channel.

19.   The power allocation and user assignment method as claimed in claim 18, wherein there is further included steps of:

   determining whether the first power or the second power
5 is a smaller power requirement; and

   assigning by the RNC the one user equipment to the broadcast channel, if the first power is the smaller power requirement or assigning the one user equipment to the dedicated channel, if the second power is the smaller power
10 requirement.

20.   The power allocation and user assignment method as claimed in claim 19, wherein if the one user equipment is assigned to the broadcast channel and power is available and
15 the one user equipment is outside a current coverage area for the broadcast channel, there is further included a step of increasing the first power of the broadcast channel for the one user equipment according to

20        $P_B(K) = P_B(K) + P_{\Delta B}(i)$.

21.   The power allocation and user assignment method as claimed in claim 20, wherein if the first power of the broadcast channel is increased there is further included a
25 step of decreasing the available power for the MBMS service according to

     $P_{B,AVAIL} = P_{B,AVAIL} - P_{\Delta B}(i)$.

22. The power allocation and user assignment method as claimed in claim 21, wherein there is further included a step of setting a new coverage threshold corresponding to a signal/noise of the pilot signal corresponding to the one user
5   equipment.

23. The power allocation and user assignment method as claimed in claim 22, wherein there is further included steps of:
10   assigning by the RNC the one user equipment to the broadcast channel; and
       broadcasting the new coverage threshold to the plurality of user equipments.

15   24. The power allocation and user assignment method as claimed in claim 19, wherein there is further included a step of if the first power of the broadcast channel is greater than an available MBMS power, increasing by the RNC the first power on the broadcast channel according to
20       $P_B(K) = P_B(K) + P_{B,AVAIL}$; and
       decreasing the available MBMS power according to
       $P_{B,AVAIL} = 0$.

25. The power allocation and user assignment method as
25   claimed in claim 24, wherein there is further included a step of setting by the RNC a new coverage threshold corresponding to a maximum power for the MBMS service.

26.   The power allocation and user assignment method as
30   claimed in claim 26, wherein there is further included steps of:
       assigning, by the RNC, the one user equipment to the broadcast channel; and

broadcasting the new coverage threshold to the plurality of user equipments.

27.   A power allocation and user assignment method for multimedia broadcast multicast services (MBMS services) in a mobile communication system between one user equipment of a plurality of user equipments and a radio network controller
5   (RNC), the power allocation method comprising the steps of:
        requesting by the one user equipment coupling to the MBMS services;
        transmitting a pilot signal to the one user equipment;
        measuring by the one user equipment a signal/noise (S/N)
10   of the pilot signal as received by the one user equipment;
        receiving by the one user equipment a signal/noise (S/N) of a coverage threshold; and
        comparing by the one user equipment the S/N of the pilot signal with the S/N of the coverage threshold.
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28.   The power allocation and user assignment method as claimed in claim 27, wherein there is further included the steps of:
        determining by the one user equipment whether a timer is
20   expired; and
        if the timer is expired, performing the steps of requesting, transmitting, measuring, receiving and comparing.

29.   The power allocation and user assignment method as
25   claimed in claim 28, wherein if the timer is expired, there is further included a step of resetting the timer.

30.   The power allocation method as claimed in claim 28, wherein if the timer is expired and if the S/N measured by the
30   one user equipment is less than the S/N of the coverage threshold there is further included a step of transmitting the measured S/N of the pilot signal to the RNC.

31. The power allocation and user assignment method as claimed in claim 27, wherein there is further included a step of assigning the one user equipment to a broadcast channel if the S/N of the pilot signal corresponding to the one user
5   equipment is within a first group of the plurality of user equipments.

32. The power allocation and user assignment method as claimed in claim 31, wherein there is further included a step
10   of assigning the one user equipment to a dedicated channel of the one user equipment is in a second group of the plurality of user equipments.

33. The power allocation and user assignment method as
15   claimed in claim 32, wherein if the one user equipment is requesting MBMS services in progress, there is further included a step of assigning the one user equipment to the broadcast channel if the incremental power required for the broadcast channel is less than the power required for a
20   dedicated channel.

34. The power allocation and user assignment method as claimed in claim 33, wherein if the one user equipment is requesting MBMS service in progress, there is further included
25   a step of assigning the one user equipment to the dedicated channel, if the power required for a dedicated channel is less than the incremental power required for the broadcast channel.

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